REMARKS

The Office Action dated May 22, 2009, and subsequent Advisory Action dated July 27, 2009, has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

In this Response, claims 2, 8, 11, 13, 14, and 16-19 have been amended to more particularly point out and distinctly claim the subject matter of the present invention. Support for the above amendments is provided in the specification, at least, on page 17, line 26, to page 18, line 15. Accordingly, claims 2, 8, 11, 13, 14, and 16-19 are currently pending in the application, of which claims 2 and 11 are independent claims.

In view of the above amendments and the following remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending rejections to the claims for the reasons discussed below.

Claim Rejections under 35 U.S.C. §102(b)

The Office Action rejected claims 2, 8, 11, 13-14, and 16-19 under 35 U.S.C. §102(b) as being allegedly anticipated by, or in the alternative, under 35 U.S.C. §103(a) as being allegedly unpatentable over Kaufman (U.S. Patent No. 4,011,077). Applicants respectfully submit that the claims recite subject matter that is neither described nor suggested in Kaufman. Applicants respectfully submit that the claims recite subject matter that is neither described nor suggested in Kaufman.

Claim 2, upon which claims 8 and 16-19 depend, recites a layered Fe-based alloy

member. The layered Fe-based alloy member includes a coating disposed on an outer surface of a surface layer portion of the layered Fe-based alloy member. The coating includes a carbide formed by carbonizing a first element that comprises a property to increase a hardness of the layered Fe-based alloy member. The coating has a thickness of at least 0.5 mm. The layered Fe-based alloy member also includes a second element including an amount that is greater at the surface layer portion than at an inside portion of the layered Fe-based alloy member. An amount of the first element is greater at the inside portion than at the surface layer portion of the layered Fe-based alloy member. A hardness of the layered Fe-based alloy member is greater at the inside portion than at the surface layer portion of the layered Fe-based alloy member.

Claim 11, upon which claims 13-14 depends, recites a method for producing a layered Fe-based alloy member having an increased hardness from a surface layer portion to an inside portion thereof. The alloy further includes a coating existing on an outer surface of the surface layer portion. The coating contains a thickness of at least 0.5 mm and a carbide formed by carbonizing a first element that has a property for increasing hardness of an Fe-based alloy member. A second element, other than the first element, is contained in the Fe-based alloy member. The second element has an amount which is larger in the surface layer portion as compared with the inside portion. An amount of the first element increases from the surface layer portion to the inside portion. The method includes applying, to a surface of the Fe-based alloy, a powder made up of a substance which contains the second element. The method further includes heat-treating the Fe-

based alloy with the powder applied thereto, so that the first element is diffused to the surface layer portion, and the first element reacts with carbon existing in the surface layer portion of the Fe-based alloy to form the carbide.

As will be discussed below, Kaufman fails to describe or suggest each and every element recited in claims 2, 8, 11, 13, 14, and 16-19, and therefore fails to provide the advantages and the features discussed above.

Kauffman is directed to a mechanical mixture of selected powders that are compressed into a pre-compact, whereby the pre-compact is subjected to liquid phase sintering for producing a raw alloy steel product (Kaufman, Abstract). The mixture of selected powders prevents a premature solid state diffusion of carbon between and into the base iron particles. Certain metallic elements, particularly copper, may be used an effective barrier to carbon loss during heating to the sintering temperature and while in the solid state condition (Kaufman, col. 4, lines 24-38).

Applicants respectfully submit that Kaufman fails to describe or suggest each and every element recited in claims 2 and 11. In particular, Kaufman fails to describe or suggest, at least,

> a layered Fe-based alloy <u>member</u>, comprising:
>
> a coating disposed on an outer surface of a surface layer portion of the layered Fe-based alloy <u>member</u>, the coating comprising a carbide formed by carbonizing a first element that comprises a property to increase a hardness of the layered Fe-based alloy <u>member</u>, and the coating further comprising a thickness of at least 0.5 mm; and
>
> a second element comprising an amount that is greater at the surface layer

> portion than at an inside portion of the layered Fe-based alloy <u>member</u>,
>
> wherein an amount of the first element is greater at the inside portion than at the surface layer portion of the layered Fe-based alloy <u>member</u>, and
>
> wherein a hardness of the layered Fe-based alloy <u>member</u> is greater at the inside portion than at the surface layer portion of the layered Fe-based alloy <u>member</u>,

as recited in claim 2 (emphasis added), and similarly recited in claim 11.

Embodiments of the invention are directed to providing a layered Fe-based alloy <u>member</u> with desired properties on *only a certain part* of the member, as described in the specification, at least, on page 18, line 16, to page 19, line 8. Powder is applied to the certain part of the member, *i.e.*, the workpiece-pressing part of a forging punch, so that the element of the powder diffuses only into that part of the member. Therefore, the Fe-based alloy <u>member</u> has desired properties along specific portions of the member.

In contrast, Kaufman describes that a Fe-C alloy powder is coated, and a sintered compact is obtained using the coated Fe-C alloy powder. The component coating the powder *uniformly* diffuses from the surface to the inside of the sintered compact that was obtained by sintering the coated powder. Therefore, the characteristics are *uniformly distributed over the entire sintered compact*. Therefore, Kaufman fails to describe or suggest each and every element recited in claims 2 and 11.

Claims 8 and 16-19 depend from claim 2. Claims 13 and 14 depend from claim 11. Accordingly, claims 8, 13, 14, and 16-19 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal of the rejections of claims 2, 8, 11, 13, 14, and 16-19 under 35 U.S.C. §102(b), or in the alternative, under 35 U.S.C. §103(a), and respectfully submit that claims 2 and 11, and the claims that depend therefrom, are now in condition for allowance.

Claim Rejections under 35 U.S.C. §103(a)

The Office Action rejected claims 2, 8, and 16-19 under 35 U.S.C. §103(a) as being allegedly unpatentable over Tahara (U.S. Patent No. 5,792,282) alone, or alternatively, in view of the ASM Handbook: Volume 4: Heat Treating ("ASM"). In particular, the Office Action alleged that the limitation for the coating "comprising a thickness of at least 0.5 mm" in line 5 of claim 2, is not sufficient to distinguish the subject matter of the claims from the prior art because the limitation *merely changes the proportion (thickness) of a prior art product*. In the alternative, the Office Action alleged that Tahara fails to specify the thickness of the carburized layer. The Office Action cited the ASM to allege that modifying time and/or temperature may achieve a carburized layer thickness greater than 1 mm, and therefore it would have been obvious to one of ordinary skill in the relevant art to have modified the time and temperature for the process described in Tahara to achieve any desired carburized layer thickness. Applicants respectfully disagree. Applicants respectfully submit that the claims recite subject matter that is neither described nor suggested in Tahara or the ASM, whether taken individually or in combination.

As will be discussed below, Tahara and the ASM, whether taken individually or in combination, fail to describe or suggest each and every element recited in claims 2, 8, and 16-19, and therefore fails to provide the features discussed above.

Tahara describes a <u>conventional</u> surface treatment technique for carburizing austenitic stainless steel. In particular, Tahara describes a method of carburizing the austenitic stainless steel by holding the austenitic steel in a fluorine- or fluoride-containing gas atmosphere with heating prior to carburizing and carburizing the austenitic stainless steel at a temperature not more than 680°C. The austenitic stainless steel is stable and has 1 to 6 weight % molybdenum or 13 to 25 weight % chromium. The carburized hard layer has a corrosion resistance superior to a base material of the austenitic stainless steel (Tahara, Abstract).

Tahara explicitly describes examples of carburized hard layers being formed *only* to a depth of 5 to 70 μm (*See* Tahara, col. 8, lines 35-51, and col. 9, lines 1-4). Tahara failed to contemplate the magnitude of depth of the carburized hard layers recited in the pending claims.

Embodiments of the invention provide for a coating "comprising a thickness of <u>at least 0.5 mm</u>" (500 μm) (emphasis added). Applicants' specification describes a diffusion layer 20 having a thickness, *i.e.*, the thickness of the diffused carbide, of at least 0.5 mm (<u>500 μm</u>) from the surface of the forging punch 10. The thickness may be from 3 to 7 mm (<u>3000 to 7000 μm</u>), and may be as great as 15 mm (<u>15,000 μm</u>). Hence, each of the coating thicknesses described in Applicants' specification are magnitudes greater than

the surface layer thickness of the conventional surface treatment technique described in Tahara.

Applicants' specification explains that the thick diffusion layer described for embodiments of the invention provides non-obvious advantages over the conventional layer thicknesses as described, for example, in Tahara, such as increased hardness through the alloy where the carbide is diffused, increasing the strength of the alloy in these areas. Therefore, it would not have been obvious to one of ordinary skill in the relevant art, in view of the non-obvious advantages imparted to the alloy material by a coating "comprising a thickness of <u>at least 0.5 mm</u> (500 μm)," to have modified the description of Tahara to disclose the features recited in claim 2.

The Office Action alleged that one of ordinary skill in the art knows that in order to increase the carburizing depth, one can modify time and/or temperature to achieve the desired carburizing depth. Applicants respectfully submit that the Office Action's allegations are based upon hindsight consideration of the disclosure of Applicants' specification. The Office Action failed to substantiate its allegations that the carburized depth described in Tahara could be modified to describe the depth recited in the pending claims with any support, *i.e.*, a secondary reference, and therefore is improper. Therefore, Applicants respectfully request a basis in fact and/or technical reasoning to reasonably support the Office Action's allegations that one of ordinary skill in the art would have found it obvious to increase the carburizing depth described in Tahara by a

magnitude of over eight times when Tahara explicitly describes that the maximum depth of the carburized layer is *limited* to 70 μm.

Furthermore, Applicants respectfully submit that Tahara fails to describe or suggest, at least, "a <u>coating disposed on an outer surface</u> of a surface layer portion of the layered Fe-based alloy, the coating comprising a carbide formed by carbonizing a first element that comprises a property to increase a hardness of the layered Fe-based alloy," as recited in claim 2 (emphasis added).

The Office Action alleged that Tahara describes these claimed features, citing column 6, lines 63-67, column 7, lines 35-49, and column 9, lines 1-15 of Tahara. A review of these passages demonstrates that Tahara fails to describe or suggest the aforementioned features recited in claim 2.

Tahara merely describes that $C_{23}C_6$ exists in a carburized layer. One of ordinary skill in the art would not have compared an outside layer that coats a base material, as recited in claim 2, with a carburized layer formed by carbon penetration <u>into</u> a base material. Therefore, contrary to the Office Action's allegations, Tahara fails to describe or suggest the aforementioned features recited in claim 2 ASM fails to cure the deficiencies of Tahara. Accordingly, assuming *arguendo* that Tahara could be combined with ASM, the combination of Tahara and ASM fails to describe or suggest each and every element recited in claim 2.

Claims 8 and 16-19 depend from claim 2. Accordingly, claims 8 and 16-19 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal of the rejections of claims 2, 8, and 16-19 under 35 U.S.C. §102(b), or in the alternative, under 35 U.S.C. §103(a), and respectfully submit that claim 2, and the claims that depend therefrom, are now in condition for allowance.

CONCLUSION

In conclusion, Applicants respectfully submit that Kauffman, Tahara, and the ASM, whether taken individually or in combination, fail to describe or suggest each and every element recited in claims 2, 8, 11, 13, 14, and 16-19. The distinctions previously noted are more than sufficient to render the claimed invention unanticipated and non-obvious. It is therefore respectfully requested that all of claims 2, 8, 11, 13, 14, and 16-19 be allowed, and the present application be passed to issuance.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, Applicants' undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

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Enclosures: Request for Continued Examination (RCE) transmittal
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